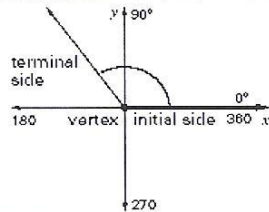


Teacher Notes – KEY

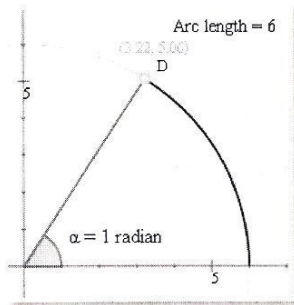
CRS	FUN 703 - Exhibit knowledge of unit circle trigonometry
Objective	<ul style="list-style-type: none"> <li>10.6 - Draw positive and negative angles on a coordinate system</li> <li>10.7 - Define and apply definition of coterminal angles</li> <li>10.9 - Convert angle measures between degrees to radians</li> </ul>

**REVIEW! (Radians – a NEW way the measure angles!) Drawing Angles in the Coordinate Plane**



*[explain: In a coordinate plane, an angle can be formed by fixing one ray, called the **initial side**, and rotating the other ray, called the **terminal side**, about the vertex.]*

**Investigate:** What a radian means using a circle of radius 6..



**central angle** >> the vertex is at the center of the circle.

Radian = subtended central angle of a circle formed by an arc whose length equals the radius, alternative way of measuring angles, or the **amount of turn**.

Subtend = “opposite” or “appears to occupy” or “extend underneath” (ARMS subtend desk, desk subtends you example)

→ The angle subtends the arc

→ The arc subtends the angle

**Ex -** What angle does the hypotenuse of a right triangle subtend? [ans: right angle]

How many radians are there in a circle?

What is the full distance around a circle?

**Notice:** arc length = the circumference is  $2\pi \times 6$ . And remember:

$$\text{angle} = \frac{\text{arclength}}{\text{radius}}$$

So in radians, the angle right around this circle is:

$$\text{angle} = \frac{2\pi(6)}{6} = 2\pi \checkmark$$

Therefore, there are  $2\pi$  radians in a full circle. ✓

**NEW STUFF:** Label the coordinate plane in terms of radians (Tell me the degree conversion for each)

**Ex. 1** Draw an angle of  $100^\circ$  and label the axes (In notebooks)



**Wait, so is it possible to have negative angle measures?** Counterclockwise movement = positive

Clockwise movement = negative

**Ex. 2)** Draw an angle of  $-280^\circ$  and label the axes.



**Ex 3)** Draw an angle of  $-30^\circ$  and label the axes. Now draw an angle of  $-390^\circ$ . What do you notice about the angles?



An angle is in “standard position” if its vertex is at the origin and its initial side lies on the positive x-axis. *All angles should be in standard position*

Co-terminal angles: terminate or “land” in the same spot, but have different notations

**To find** coterminal angle, you must add 360 or subtract multiples of 360. Coterminal angles can be POSITIVE or NEGATIVE.

**Example 4)** Find one positive and one negative coterminal angle of  $-134^\circ$

[ans: positive coterminal =  $-134^\circ + 360^\circ = 226^\circ$

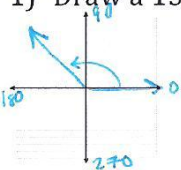
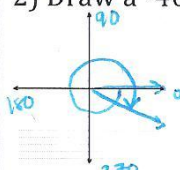
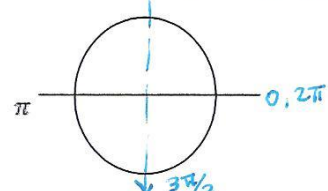
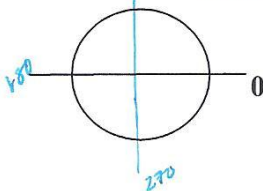
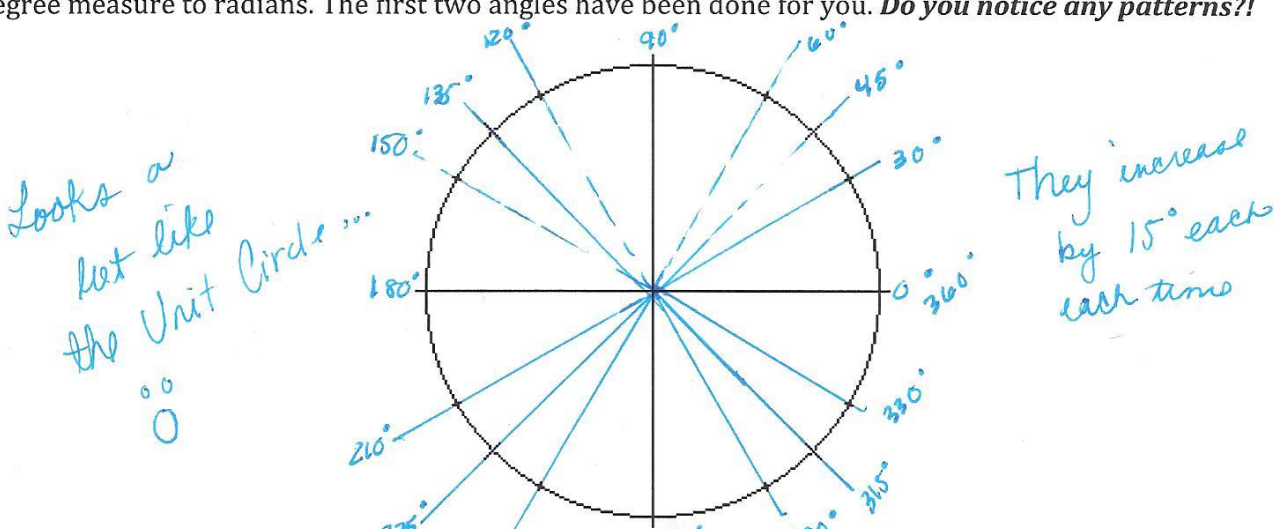
negative coterminal =  $-134^\circ - 360^\circ = -494^\circ$  ]

**Example 5)** Find one positive and one negative coterminal angle of  $395^\circ$

[ans: positive coterminal =  $395^\circ - 360^\circ = 35^\circ$

-or-  $395^\circ + 360^\circ = 755^\circ$  negative coterminal =  $395^\circ - 2(360^\circ) = -325^\circ$  ]

**PUSH IT TO THE LIMIT.**

CRS	FUN 703 - Exhibit knowledge of unit circle trigonometry
Objective	<ul style="list-style-type: none"> <li>10.6 - Draw positive and negative angles on a coordinate system</li> <li>10.7 - Define and apply definition of coterminal angles</li> <li>10.9 - Convert angle measures between degrees to radians</li> </ul>
<p>1) Draw a <math>135^\circ</math> angle.</p>  <p>a. Find one positive angle that is coterminal with the given angle. <math>135 + 360 = 495^\circ</math></p> <p>b. Find one negative angle that is coterminal with the given angle. <math>135 - 360 = -225^\circ</math></p>	<p>2) Draw a <math>-400^\circ</math> angle.</p>  <p>a. Find one positive angle that is coterminal with the given angle. <math>-400 + 360 = -40 + 360 = 320^\circ</math></p> <p>b. Find one negative angle that is coterminal with the given angle. <math>-400 + 360 = -40</math> or <math>-760^\circ</math></p>
<p>3) Name 3 <b>positive coterminal</b> angles of <math>\pi</math> in terms of radians.</p>  <p>Name 3 <b>negative coterminal</b> angles of <math>\pi</math> in terms of radians. <math>\pi - 2\pi = -\pi, -3\pi, -5\pi</math></p> <p>What is <math>\pi</math> in degrees? (Use the picture above.) <math>180^\circ</math></p>	<p>4) Name 3 <b>positive coterminal</b> angles of <math>0</math> in terms of radians.</p>  <p>Name 3 <b>negative coterminal</b> angles of <math>0</math> in terms of radians. <math>-360^\circ, -720^\circ, -1080^\circ</math></p> <p>What is <math>0</math> in degrees? (Use the picture above.) <math>360^\circ</math></p>
<p>5) <b>Directions:</b> Use a protractor to measure each angle in degree in the graph below. Then convert each degree measure to radians. The first two angles have been done for you. <b>Do you notice any patterns?!</b></p>  <p>Looks a lot like the Unit Circle...</p> <p>They increase by <math>15^\circ</math> each time</p>	

**PUSH IT TO THE LIMIT.**

